We claim:

1. An amino acid analog having the general structure

$$R_1-CH_2 \diagdown \quad \diagup COOH$$
$$C$$
$$R_2-C_yH_z \diagup \quad \diagdown NH_2$$
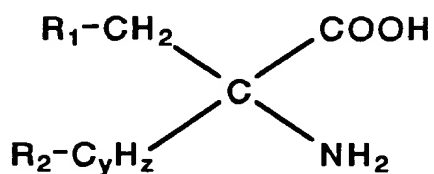
where R_1 is X, $X—CH = CH—$, R_3 or R_4

R_2 is H, or R_3 if R_1 is R_3 or R_4 if R_1 is R_4,

R_3 is $X—(CH)_j—C_mH_n—CH_q \diagdown ^{(CH_2)_x-}$

R_4 is $Z—(CH_2)_a—CH_b—CH_b—CH_q \diagdown ^{(CH_2)_x}$

such that

$$CH_2 \diagdown \quad \diagup COOH$$
$$C$$
$$C_yH_z \diagup \quad \diagdown NH_2$$
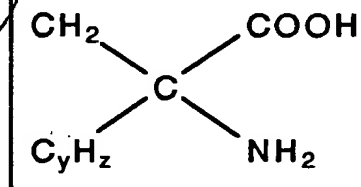
R_3 or R_4 is formed

where   a is 1, 2 or 3,
b is 0, 1 or 2,
x is 0 or 1,
y is 1 or 2,
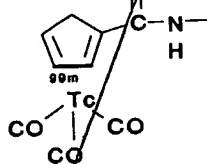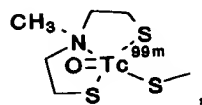z is 1, 2, 3 or 4 and z > y if y is 2,
q is 1 or 0 if n is 1 and j is 0,
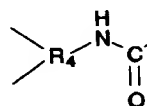n is 1 or 2, but 0 if m is 0,
m is 0 or 1,
j is 0 or 1,
X is F, ^{18}F, I, ^{123}I, ^{125}I, ^{131}I, Br, ^{75}Br, ^{76}Br,
^{77}Br, ^{82}Br, or At and
Z is

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or
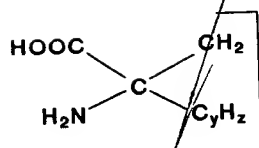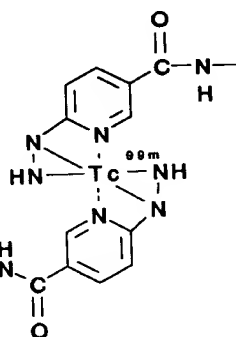
2. A compound of claim 1, wherein R_1 and $R_2 = R_3$.

3. A cyclic compound according to claim 1 wherein

    x is 0
    y is 1
    z is 2
    q is 1
    m is 0, and
    j is 0

4. A compound according to claim 3 wherein X is F, ^{18}F, I or ^{123}I.

5. A compound according to claim 3 wherein X is ^{18}F.

6. A compound of claim 1 wherein R_1 and $R_2 \neq R_3$.

7. A compound according to claim 6 wherein X is F or ^{18}F.

8. A compound according to claim 1 wherein R_1 and $R_2 = R_3$,

    x is 0 or 1
    y is 2
    z is 4
    q is 1
    m and j are each 0, and
    X is F, ^{18}F, I or ^{123}I.

9. A compound according to claim 8 wherein

    x is 1
    X is ^{18}F.

10. The compound of claim 8 wherein x is 0 and X is ^{123}I.

11. A compound according to claim 8 wherein x is 1 and X is ^{18}F.

12. A compound according to claim 1

    wherein R_1 and $R_2 = R_3$
    x is 0
    y is 1
    z is 2
    q is 0
    m is 1
    n is 1
    j is 0, and
    X is F, ^{18}F, I or ^{123}I.

13. A compound according to claim 1

    wherein R_1 and $R_2 = R_3$
    x is 1
    y is 1
    z is 1
    q is 0
    m and j are 0, and
    X is F, ^{18}F, I or ^{123}I.

14. A compound according to claim 13 wherein X is ^{123}I.
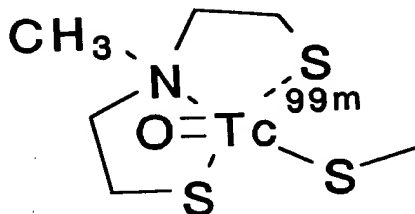
15. A compound according to claim 1

    wherein R_1 and $R_2 = R_3$
    x is 0
    y is 1
    z is 2
    q is 1
    m is 1
    n is 1
    j is 1, and
    X is F, ^{18}F, I or ^{123}I.

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16.   The compound of claim 15 wherein X is ^{123}I.

17.   A compound according to claim 1

       wherein R_1 and $R_2 = R_3$
              x is 0
              y is 1
              z is 2
              q is 0
              m is 0
              j is 1, and
              X is F, ^{18}F, I or ^{123}I.

18.   The compound of claim 17 wherein X is ^{123}I.

19.   A compound according to claim 1

       wherein R_1 is X-CH=CH-
              R_2 is H
              y is 1 and
              z is 2

20.   The compound of claim 19 wherein X is ^{123}I.

21.   A compound according to claim 1

       wherein R_1 and $R_2 = R_3$
              x is 0 or 1
              y is 2
              z is 4
              q is 1
              m is 1
              n is 1
              j is 1, and
              X is F, ^{18}F, I or ^{123}I.

22.   The compound of claim 21 wherein X is ^{18}F.

23.   The compound of claim 21 wherein X is ^{123}I.

24.   A compound according to claim 1

       wherein R_1 and $R_2 = R_3$
              x is 0 or 1
              y is 2
              z is 4
              q is 0
              m is 0
              j is 1, and
              X is F, ^{18}F, I or ^{123}I.

25.   The compound of claim 24 wherein X is ^{18}F.

26.   The compound of claim 24 wherein X is ^{123}I.

27.   A compound according to claim 1 wherein R_1 is R_4.

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28. A compound according to claim 27 wherein Z is

$$\text{CH}_3-\text{N}\overset{\displaystyle\diagup\diagdown}{\underset{\displaystyle O=Tc}{\Big|}}\overset{S}{\underset{S}{\diagup}}\,\text{99m}$$
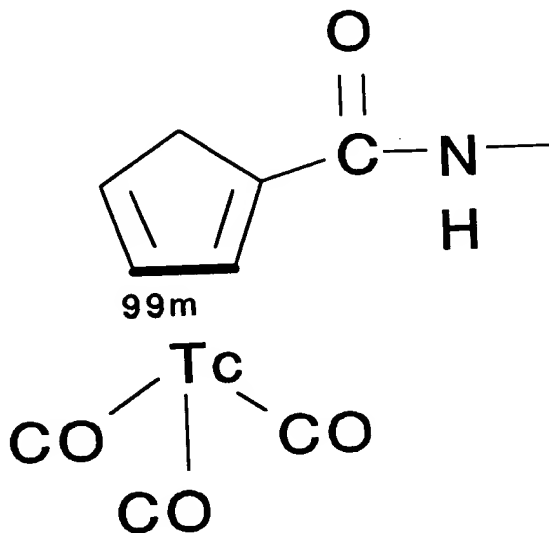
CH₃ N — (ethylene bridges) — S
O=Tc 99m
S — S—

.

29. A compound according to claim 28 wherein a is 1, 2 or 3 and b is 0.

30. A compound according to claim 28 wherein a is 1, 2 or 3 and b is 1.

31. A compound according to claim 28 wherein a is 1, 2 or 3 and b is 2.

32. A compound according to claim 28 wherein Z is

$$\begin{array}{c}\text{O}\\\parallel\\ \text{C}-\text{N}-\\\qquad|\\\qquad\text{H}\end{array}$$

(cyclopentadienyl ring, labeled 99m)

Tc
CO — | — CO
CO
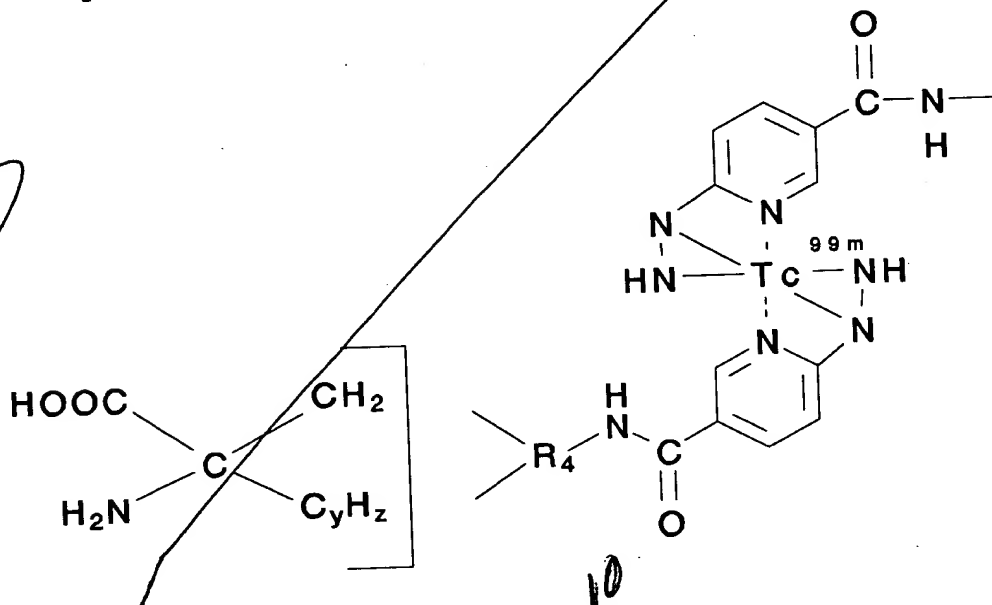
33. A compound according to claim 32 wherein a is 1, 2, or 3 and b is 0.

34. A compound according to claim 32 wherein a is 1, 2 or 3 and b is 1.

35. A compound according to claim 32 wherein a is 1, 2 or 3 and b is 2.

36. A compound according to claim 28 wherein Z is

$$
\begin{array}{c}
\text{HOOC}\diagdown\;\;\;\;\diagup\text{CH}_2 \\
\text{C} \\
\text{H}_2\text{N}\diagup\;\;\;\;\diagdown\text{C}_y\text{H}_z
\end{array}
$$

[structure showing a pyridine-containing Tc-99m chelate: a pyridine ring bearing a C(=O)–N–H amide at top, coordinated to HN–Tc(99m)–NH, with a second pyridine ring bearing a C(=O) amide linked to –N(H)–R₄]

37. A compound according to claim 36 wherein a is 1, 2, or 3 and b is 0.

38. A compound according to claim 36 wherein a is 1, 2, or 3 and b is 1.

39. A compound according to claim 36 wherein a is 1, 2, or 3 and b is 2.

40. A method of *in situ* tumor imaging by ~~positron emission tomography of~~ single photon emission tomography comprising:

administering to a subject suspected of having a tumor an image-generating amount of a compound according to claim ~~2~~, and

measuring the distribution of the compound in the subject by ~~positron emission tomography or~~ single photon emission tomography.